



# Taylor Engineering

LLC

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July 17, 2003

Karim Amrane  
ARI  
4100 North Fairfax Drive, Suite 200  
Arlington, VA 22203-1629

Subject: Your letter of May 30<sup>th</sup>, 2003 to the California Energy Commission

Dear Karim:

I am writing on behalf of the California Energy Commission in response to your letter of May 30<sup>th</sup>, the issue of Section 144(i). You raised a number of issues and I will respond to each in order in the paragraphs below. Please note that the proposed standard is a prescriptive requirement. As such the performance method of compliance can be used to apply air-cooled chillers to projects larger than 300 tons.

**Use of LCC for Chiller Selection:** The CEC has a legal mandate to ensure that requirements are life-cycle cost effective. As you can see from the attached consultant's report, "Code Change Proposal for Cooling Towers" dated April 8<sup>th</sup>, 2002, this requirement was based on a thorough life-cycle cost analysis.

**Water Quality:** We recognized that there were areas where the water quality could pose problems to the application of water-cooled equipment and provided an exception for water-quality to address this issue.

**The Cost of Water and Chemical Treatment:** The cost of water and water-treatment was considered in the aforementioned life-cycle cost analysis on which this requirement is based. Table 1 of the aforementioned report has line items for water, chemicals and the installed cost of a chemical treatment system.

**Operator Skill:** We agree that water-cooled plants require a higher degree of skill to maintain. As this requirement is set for plants at or above 300 tons we are looking at buildings that are 100,000 ft<sup>2</sup> or larger. It is our experience that these larger facilities either have in-house building engineers that can maintain these systems or outsource maintenance to a service company.

**Movement of Market to Packaged Equipment:** This argument is somewhat specious as central plants are typically installed either where packaged units could not work or where a greater degree of control is desired. However, since air-cooled chilled water systems are generally less efficient than packaged roof top systems (due to the elimination of the pumps and an additional heat exchanger) a shift from a air-cooled plant to package units would most likely save energy.

**Chiller Efficiencies:** The efficiencies in our report and life-cycle cost analysis match those in the proposed Standard at full load (the same values that are used in ASHRAE/IES Standard 90.1-2001). The standard DOE2 part-load curves for air- and water-cooled equipment were used. I am unclear what these higher proposed efficiencies for air-cooled chillers are that you refer to in your letter. They do not exist in the current draft of either Title 24 or 90.1. Efficiencies used for our analysis are summarized in Tables 4 and 5.

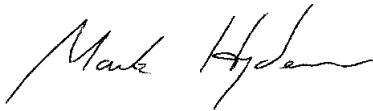
**Legionnaires Disease:** ASHRAE in their white paper on Legionnaires disease does not have any specific recommendations for avoiding the use of water-cooled systems and cooling towers. I sincerely doubt that ARI has a written stance on air-cooled systems being safer than water-cooled equipment. If a tower and outside air intakes are sited following common sense guidelines and chemical treatment is properly applied, cooling towers are not considered by the experts to be a health risk. However if an owner wanted to avoid cooling towers they could still use either air-cooled packaged units or air-cooled chillers and the performance method of compliance.

**Difficulty in Comparing Chiller Technologies:** If this same argument was taken to its logical extreme we would be unable to set any standards. The same is clearly true for equipment efficiencies that not only change in cost effectiveness by building type but strongly by climate as well! I doubt that you would advocate different equipment efficiencies by occupancy and climate. The procedure used for this requirement follows the same procedure used in other requirements in Title 24 and 90.1.

I hope that this answers your questions and concerns

**Sincerely,**

Taylor Engineering LLC

A handwritten signature in black ink, appearing to read "Mark Hydeman". The signature is fluid and cursive, with the first name "Mark" and last name "Hydeman" clearly distinguishable.

Mark Hydeman, P.E.  
Principal